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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
| 10/541,457 | 07/06/2005 | Hiroshi Sugitatsu | 273286US0PCT | 8208 |
| 22850 7590 09/27/2007 OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314 | | | EXAMINER MCNELIS, KATHLEEN A | |
| | | | ART UNIT 1742 | PAPER NUMBER |
| | | | NOTIFICATION DATE 09/27/2007 | DELIVERY MODE ELECTRONIC |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| <p align="center">Office Action Summary</p> | Application No. 10/541,457 | Applicant(s) SUGITATSU ET AL. | |
| | Examiner Kathleen A. McNelis | Art Unit 1742 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 and 3-8 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1 and 3-8 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ 5) <input type="checkbox"/> Notice of Informal Patent Application 6) <input type="checkbox"/> Other: _____ |
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Claims Status

Claims 1 and 3-8 remain for examination where claim 1 is amended.

Acknowledgement of RCE

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(c), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.115, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 09/07/2007 has been entered.

Examiner's Comments

The present amendment changes both the specification and the claimed heating rate. The calculation of the claimed heating rate as originally presented on pp. 27-28 of the specification obviously contained a math error since inconsistent results were reported (see 6/6/2007 amendment after final and 6/15/2007 Advisory action). It is examiner's opinion that the version of the calculation and values submitted with the 09/07/2007 amendment is correct as amended, since it is consistent with the written description. Further, examiner finds support for the amendments to the specification and claims as follows:

- The specification recites that the pellets were charged to the furnace at 25 °C and that the temperature of the pellets must be raised to at least 1,114 °C (specification p. 27 lines 13-25), which supports the amendment to the equation changing 50 °C to 25 °C.
- The specification recites that the estimated residence time for pellets to reach 50% metallization is about 78 seconds (specification p. 27 lines 13-25), which supports the amendment to the claims changing the heating rate from 13.6 °C/sec to 13.96 °C/sec.

Status of Previous Rejections

The following rejections are withdrawn in view of cancellation of the claims:

- Claims 9-11 under 35 U.S.C. 103(a) as being unpatentable over Kundrat (U.S. Pat. No. 5,567,224), or Kikuchi et al. (U.S. Pat. No. 6,592,649), or Ibaraki et al. (U.S. Pat. No. 6,755,888) alone or in view of Takeda et al. (U.S. Pat. No. 6,270,552) in view of Meissner et al. (5,730,775) and Perry's Chemical Engineers' Handbook.

The following rejections are maintained:

- Claims 1 and 7 under 35 U.S.C. 103(a) as being unpatentable over Kundrat (U.S. Pat. No. 5,567,224), or Kikuchi et al. (U.S. Pat. No. 6,592,649), or Ibaraki et al. (U.S. Pat. No. 6,755,888) alone or in view of Takeda et al. (U.S. Pat. No. 6,270,552) in view of Meissner et al. (5,730,775) and Perry's Chemical Engineers' Handbook,
- Claims 3, 4 and 8 under 35 U.S.C. 103(a) as being unpatentable over Kundrat (U.S. Pat. No. 5,567,224) or Kikuchi et al. (U.S. Pat. No. 6,592,649) in view of Meissner et al. (5,730,775) and Perry's Chemical Engineers' Handbook as applied to claim 1, and
- Claims 5 and 6 under 35 U.S.C. 103(a) as being unpatentable over Kikuchi et al. (U.S. Pat. No. 6,592,649) in view of Meissner et al. (5,730,775) and Perry's Chemical Engineers' Handbook as applied to claim 1.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kundrat (U.S. Pat. No. 5,567,224), or Kikuchi et al. (U.S. Pat. No. 6,592,649), or Ibaraki et al. (U.S. Pat. No. 6,755,888) alone or in view of Takeda et al. (U.S. Pat. No. 6,270,552) in view of Meissner et al. (5,730,775) and Perry's Chemical Engineers' Handbook.

Kundrat or Kikuchi et al. or Ibaraki et al. alone or in view of Takeda et al. and in view of Meissner et al and Perry's Chemical Engineers' Handbook is applied as discussed in the 01/12/2007 Office action.

Regarding the amended limitation to claim 1 changing the heating rate from 13.6 to 13.96 °C/sec, Kundrat or Kikuchi et al. or Ibaraki et al. alone does not disclose that the average rate of raising the temperature of the mixture in the reducing step is 13.96 °C/min or higher from the initiation of the radiation until the mixture reaches 1,114 °C.

Meissner et al. discloses a method for producing direct reduced iron from dry compacts of iron oxide and carbonaceous material (abstract). Compacts are exposed to a radiant heat source in a rotary hearth furnace preheating zone (col. 1 lines 10-15). Results presented by Meissner et al. demonstrate that the higher the temperature of the radiant heat source, the faster the compacts reach metallization goals and thus productivity can be increased (col. 5 lines 1-21). While Meissner et al. does not equate the higher temperature with increased heating rate, one of ordinary skill in the art would recognize that the rate of radiant heat transfer in a furnace is strongly affected by temperature (T^4) as taught by Perry's Chemical Engineer's Handbook (p. 5-23 to 5-32). Meissner et al. therefore demonstrates that the temperature of the radiant heat transfer source is a result effective variable which is varied to affect the time required to achieve metallization goals and improve productivity and Perry's Chemical Engineer's Handbook teaches that increasing the temperature of the radiant heat source increases the heating rate as a function of T^4 . It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the radiant heat source temperature as a result-effective variable in the process of Kundrat or Kikuchi et al. or Ibaraki et al. alone or in view of Takeda et al., therefore adjusting the rate of heating to

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affect the time required to achieve metallization goals and thereby increase productivity as taught by Meissner et al. (see M.P.E.P 2144.05, II, B).

Claims 3, 4 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kundrat (U.S. Pat. No. 5,567,224) or Kikuchi et al. (U.S. Pat. No. 6,592,649) in view of Meissner et al. (5,730,775) and Perry's Chemical Engineers' Handbook as applied to claim 1.

Kundrat or Kikuchi et al. in view of Meissner et al. and Perry's Chemical Engineers' Handbook is applied as discussed in the 01/12/2007 Office action.

Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kikuchi et al. (U.S. Pat. No. 6,592,649) in view of Meissner et al. (5,730,775) and Perry's Chemical Engineers' Handbook as applied to claim 1.

Kikuchi et al. in view of Meissner et al. and Perry's Chemical Engineers' Handbook is applied as discussed in the 01/12/2007 Office action.

Response to Arguments

Applicant's arguments filed 09/07/2007 have been fully considered but they are not persuasive.

Arguments are summarized as follows:

1. A declaration was filed under 37 C.F.R. 1.132 which presents arguments regarding the rejection grounds.
2. Applicant does not agree that Meissner et al. is relevant or sheds any light on the present invention since Meissner et al. pertains to iron oxides not chromium oxides.
3. Applicants argue that rapid temperature rise limitation is not simply rapid heating but rather raising the temperature to a particular minimum rate and for a particular period, ending at a particular end temperature.
4. Perry is even less pertinent, since it has been relied on simply for a finding that the rate of radiant heat transfer in a furnace is strongly affected by temperature.

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5. Increasing the temperature with chromium containing material is not known in the art as a result effective variable.
6. Applicant cites the work of Kamijo et al. (U.S. 6,152,983) which is an early work of the present assignee where a heating rate of from 3 to 13 °C was used in a temperature range of from 150 to 900 °C.

Examiner's responses are as follows:

1. The arguments presented in the declaration are addressed below. The 1.132 declaration does not appear to provide any evidence to show the criticality of the claimed heating rate of 13.96 °C/sec.
2. The primary references Kundrat or Kikuchi et al. or Ibaraki et al. each disclose reducing a mixture of iron and chromium oxides:
 - a. Kundrat discloses reduction stainless steel flue dust (see p. 3 lines 8-18 of the 01/12/2007 Office action) which contains both iron and chromium oxide;
 - b. Kimuchi et al. discloses reducing iron and chromium oxides (see p. 3 line 19 – p. 4 line 4 of the 01/12/2007 Office action); and
 - c. Ibaraki et al. discloses reducing mixed iron and chromium ore (see p. 4 lines 5-10 of the 01/12/2007 Office action), which is a mixture containing iron and chromium oxides.

Each of the primary references is in the same field of endeavor as the instant invention since each discloses reduction of chromium oxides. The teachings of Meissner et al. related to reduction of iron oxides is in the same field of endeavor and relevant to each of the primary references, since each of the primary references discloses reduction of iron oxides.

3. The instant claims recite a heating rate of 13.96 °C/sec until a temperature of 1,114 °C is reached. Kundrat discloses heating to at least 1,000 °C, preferably 1200 °C (col. 4 lines 19-40); Kimuchi et al. discloses heating rapidly to 1100 °C (col. 13 line 42-col. 14 line 5); and Ibaraki et al. discloses heating quickly to 1100 to 1300 °C (col. 13 line 42-col. 14 line 5); therefore each of the primary references teaches heating to the approximate endpoint in the instant claims. Meissner et al. teaches the benefit of rapid

heating to more quickly reach metallization goals and thus improve productivity (col. 5 lines 1-21). The teaching of Meissner et al. is applied to the primary references as discussed above regarding claim 1. Meissner et al. is analogous art and in the same field of endeavor as each of the primary references as discussed above in the response to argument 2.

4. The instant claims recite a heating rate. Meissner et al. teaches the use of a higher temperature to increase productivity. Perry's is cited as evidence that a higher temperature results in a higher heating rate.
5. Increasing the heating rate to improve productivity when reducing iron oxides is known in the art as discussed above regarding Meissner et al. in view of Perry's. Each of the primary references discloses reduction of iron oxides; therefore it would have been obvious to use the teaching of Meissner et al. in view of Perry's in the primary references to increase productivity. Further, even though the primary references also disclose reduction of chromium oxides in addition to iron oxides, the combination would have been obvious in view of Meissner et al in view of Perry's teaching of the improved productivity results when applied to iron oxides.
6. The relevance of this argument is unclear. Examiner has not cited the Kamijo et al. reference as prior art.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen A. McNelis whose telephone number is 571 272 3554. The examiner can normally be reached on M-F 8:00 AM to 4:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

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may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KAM
09/19/2007

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12-11
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